The Economic Impact of Deepening the Mississippi River to 50 Feet

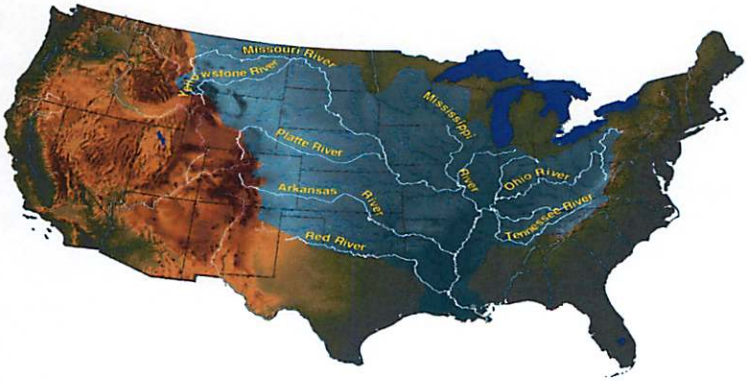
By: Timothy P. Ryan, Ph.D.

August 22, 2013

The Economic Impact of Deepening the Mississippi River to 50 Feet

TABLE OF CONTENTS

BIG RIVER COALITION



Sean M. Duffy, Sr.
Executive Director
4741 Utica Street, Suite 200
Metairie, LA 70006

Office (504) 833-4190 x 805
Cellular (504) 338-3165
sean.duffy@bigrivercoalition.org

August 22, 2013

FOREWORD

The Big River Coalition attributes the visualization for Dr. Ryan's report, "The Economic Impact of Deepening the Mississippi River to 50 Feet," to a brainstorming session held after meeting with the Corps' Institute of Water Resources (IWR) on July 31, 2012. The urgency placed upon this report was also prudent based on the Obama Administration's announcement of the "We Can't Wait Initiative" that 7 nationally and regionally important infrastructure projects would be expedited to help modernize (deepen) 5 major ports on the Atlantic Coast (Ports at Jacksonville, Miami, Savannah, Charleston, New York/ New Jersey). The Coalition was immediately concerned that these ports had just been highlighted by the IWR's "*U.S. Port and Inland Waterways Modernization: Preparing for Post-Panamax Vessels*," report to Congress on the nation's preparedness for the Post-Panamax port environment. The Coalition also realized the importance of partnering with the Louisiana Department of Transportation and Development, the non-federal sponsor for Lower Mississippi River (LMR) deepening efforts, and was quite pleased when Secretary Sherri LeBas agreed to and embraced this dually commissioned economic impact study.

The Coalition's efforts to address their concerns directly with the Institute of Water Resources led to their publishing a "Memorandum For The Record" (enclosed) to this Congressional report on August 24, 2012. The conclusion of this Memorandum states:

> "IWR agrees that Port & Inland Waterways Modernization report could have considered deepening Federal channels on the Gulf coast to primarily serve post-Panamax bulk vessels. Such waterway modernization efforts are well within the range of opportunities presented by the increasing deployment of post-Panamax sized vessels of all types."

Senator David Vitter, as the Ranking Member of the U.S. Senate's Committee on the Environment and Public Works, greatly assisted the LMR deepening efforts by including a provision in the Water Resources Development Act of 2013 (S. 601) to increase the channel maintenance depth limitation for full federal responsibility to 50 feet from 45 feet.

BIG RIVER COALITION

The Big River Coalition and Louisiana Department of Transportation and Development are proud to release this official economic impact report that clearly demonstrates the deepening of the LMR to 50 feet is economically justified. There are indications that the Obama Administration may soon release the Second Phase port projects of the "We Can't Wait Initiative" and the Coalition believes that the Louisiana Delegation will use this report to demonstrate the importance of deepening the River to our national economy.

The logical path forward includes accepting that the federal limitation for channel maintenance will be increased to 50 feet through a ratified WRDA Bill. The LMR channel was authorized to a depth of 55 feet in the WRDA Bill of 1986; however, the channel was never deepened below 45 feet because of the onerous annual maintenance requirement. The annual maintenance costs have long been what stopped this project from moving forward and the proposed amendment in the Senate WRDA Bill could serve to remove that burdensome requirement and make the annual maintenance a responsibility of the Federal Government to be funded through the Harbor Maintenance Trust Fund that currently has a surplus of $8 billion.

The Big River Coalition membership agreed upon a reduced draft from the authorization of 55 feet in order to move the project forward and match the controlling draft of the new locks on the Panama Canal at 50 feet. The Mississippi River deepening efforts have historically considered a two-phased implementation strategy. Phase 1 is the deepening in the area of Southwest Pass and Phase 2 the deepening above New Orleans (the Crossings Above New Orleans). This logical approach would allow the Phase 1 deepening project to focus from Venice (Mile 10 Above Head of Passes) on out to the Gulf of Mexico via Southwest Pass (Mile Below Head of Passes). The completion of the Phase 1 deepening of this 30 mile reach of River would automatically connect 175 miles of the Mississippi River because of the naturally deep channel above Venice and up to Belmont Crossing at Mile 154 Above Head of Passes. The deepening cost for the Phase 1 portion is estimated to be $195 million with annual maintenance costs of approximately $60 million. The Phase 2 portion of the project would begin at Belmont Crossing and require dredging at several of the Crossings to the Baton Rouge Harbor at Mile 232 Above Head of Passes. The deepening cost for the Phase 2 portion is approximately $105 million with annual maintenance costs of $30 million. The sediment removed during the deepening project presents an excellent opportunity to beneficially use the material and replenish the fragile deltaic wetlands through sediment recycling.

The Big River Coalition and the Louisiana Department of Transportation and Development are proud to share this important economic study and remain hopeful that this study will be used as a centerpiece for discussions to deepen the Lower Mississippi River. I would like to personally thank LDOTD for their partnership and Dr. Ryan for his professionalism and patience.

Best Regards,

Sean M. Duffy

Sean M. Duffy, Sr.
Executive Director

EXECUTIVE SUMMARY

- The Mississippi River is the maritime highway to the vast central portion of the United States. Much of the commodities and goods produced in the heartland of the United States are brought to world markets via the Mississippi River and Tributaries (MRT). Likewise, important products are transported from the rest of the world to the 31 states connected by the MRT.
- Much of the Midwest grain and crop production can only competitively enter world markets through waterborne commerce utilizing the MRT. A large portion of the United States gasoline supply is transported as foreign crude oil to refineries along the Mississippi River. It is not an exaggeration to say that the economy of a large part of the country is dependent on the Mississippi River for both the inbound movement of raw materials into domestic production processes, especially crude oil, as well as the outbound movement of goods produced in the United States destined for world markets.
- In order to take advantage of the new larger vessels that will be used increasingly in the future after the opening of the new Panama Canal locks, the Mississippi River must be deepened to 50 feet. The deepening of Southwest Pass, the navigable deep-draft entrance to the River, from the effectively maintained depth of 47 feet to 50 feet would open up approximately 175 miles of the Lower Mississippi River to accommodate post-Panamax vessel transits (Phase 1).
- This report will estimate the benefit/cost ratio involved in deepening the Lower Mississippi River and Tributaries to 50 feet to accommodate the larger vessels that will be used more heavily in the future. The benefits will be measured by the resulting increase in total spending in the U. S. economy as a result of the deepening. The costs will be compared against the costs of the actual dredging itself. The costs of the dredging is predicted to include a one-time component of $300 million and an annual increase in on-going channel maintenance of $90 million per year.
- The impact of deepening the River to 50 feet will occur in two ways: first, current vessels will be able to carry larger quantities of cargo and second, we will expect larger and larger vessels will be used to carry cargo through the Lower Mississippi River.
- In 2011, the base year of this study, there were several long periods that required draft restrictions down to 43 feet during the period with the most shoaling. These restrictions were exceptions due to inadequate funding. In years past the River was dredged to an average depth that allowed 47 feet of draft. Increasing the draft will allow existing ships to accommodate additional cargo.
- This study assumes a gradual increase in the number of post-Panamax and Cape Size vessels using the LMR starting in 2017 and reaching a steady state in 2024, a period of eight years. The model assumes that the number of vessels that can handle more than 75,000 tons of cargo will increase by 2% the first year, 5% the second year, 8% the third year, 11% the fourth year, 13% the fifth year, 14% the sixth year, 16% the seventh year, and 18% the eighth year. Thus, by 2024 we

assume that there will be 18% more large ships carrying the top ten commodities than in 2011.

- Based on 2011 cargo movements on the LMR, the following commodities will be impacted by deepening the River to 50 feet: Crude Oil, Pig Iron, Iron Ore, and Gasoline on the import side; Corn, Soybeans, Coal, Crude Oil, Pig Iron, and Iron Ore on the export side.
- At the end of an eight-year period of phasing in the implementation of the usage of the larger post-Panamax ships, the deepening of the Lower Mississippi River to 50 feet will accommodate an increase of an estimated 24.36 million tons of cargo, valued at $16.26 billion. (See Table S1)
- Once all effects are fully phased in, cargo volumes related to the proposed deepening of the MRT will equate to an estimated 9.8% increase as compared against 2011 data. This is a very conservative estimate and indicates that the deepening of the MRT creates significant economic value at relatively low increases in cargo movements.

Table S1

Summary of Increase Tonnage and Values Created by Deepening the LMR to 50 Feet

Year	Tonnage	Percent of 2011	Value
2017	7,294,705	2.9%	$4,833,866,349
2018	10,142,278	4.1%	$6,756,754,446
2019	13,275,808	5.3%	$8,849,468,041
2020	17,053,228	6.8%	$11,374,734,656
2021	19,142,248	7.7%	$12,769,877,053
2022	20,186,758	8.1%	$13,467,448,252
2023	22,275,778	8.9%	$14,862,590,648
2024	24,364,798	9.8%	$16,257,733,045

Source: Author's Calculations

- After the eight-year period of adjustment in the industry occurs, the impacts will be considerably larger. In 2024, the Louisiana economy will gain $146.83 million

in direct spending, $115.57 million in secondary spending for a total spending impact of $262.40 million. In addition, the Louisiana economy will gain $50.21 million of income annually for its residents and 908 new permanent jobs in the state. Local governments will gain $2.84 million annually in tax revenue, the state government $3.60 million in tax revenues, and the federal government $5.55 million annually in income tax revenues forever. Over the first 20 years after the deepening, the total new spending created by the project in Louisiana alone will be $5.03 billion.

- The economic impact on the United States economy of deepening the LMR consists of two separate components: 1) Increased production in the United States caused by the lower costs of exporting goods to other countries; and 2) The impact of lower gasoline prices due to the reduced costs of importing crude oil into the United States. Adding these two components together produces the total impact of deepening the Lower Mississippi River and tributaries to allow for 50-foot depths. Once all effects are phased in (in 2024), American producers, mostly farmers, and consumers will see a direct positive impact of $5.876 billion. The ripple effect, or secondary spending effect, could add another $5.615 billion. The total potential gain to the U. S. economy of the enhanced deepening will be $11.491 billion in increased production and lower gasoline prices once all affects are phased in.
- In addition, the U.S. economy will add 16,991 jobs as a result of the increases in production and $849.5 million in increased income for American workers. Finally, when the private sector increases production and jobs, state, local, and federal governments see increases in revenue. The economic impact resulting from the increased deepening will create $111.5 million annually in increased revenues for state and local governments and the federal government would gain $132.8 million annually in tax revenues.
- The case for increased spending on deepening could not be clearer. The future benefits and costs are discounted to the present using the current long-term (20 Year Constant Maturity) U. S. Treasury bond rate of 3.50%. The present value of the ten-year projections of the benefits and costs from reduced deepening presents a startling comparison. The benefits of the activity outweigh the costs no matter what measure of benefits are used.
- If direct impacts are used as the benefit measure, the B/C ratio is 45.7. In cost benefit analysis, a B/C ratio of one implies that the benefits and costs are equal. A B/C ratio of more than one implies the benefits outweigh the costs and a B/C ratio of less than one implies the costs outweigh the benefits. If total impacts are used, the B/C ratio is 89.4. Finally, the new tax revenues created by the deepening will offset the costs of the dredging project. The project pays for itself and creates billions of dollars of new spending in the United States economy and almost 17,000 new permanent jobs in the country.
- Under any measure, the decision by the government to increase the Corps' funding for deepening the Lower Mississippi River to 50 feet is a good public policy decision.

INTRODUCTION

The Mississippi River is the highway to the vast central portion of the United States. Much of the commodities and goods produced in the heartland of the United States are brought to world markets via the Mississippi River and Tributaries (MRT). Likewise, important products are transported from the rest of the world to the 31 states connected by the MRT.

Much of the Midwest grain and crop production can only competitively enter world markets through waterborne commerce utilizing the MRT. A large portion of the United States gasoline supply is transported as foreign crude oil to refineries along the Mississippi River. It is not an exaggeration to say that the economy of a large part of the country is dependent on the Mississippi River for both the inbound movement of raw materials into domestic production processes, especially crude oil, as well as the outbound movement of goods produced in the United States destined for world markets.

According to the United States Bureau of the Census, in 2010, 13.1% of all United States waterborne foreign trade moves through the Lower Mississippi River. Total United States waterborne foreign commerce in 2010 was 1,440,937,396 short tons. Of that total, the Lower Mississippi River system from Baton Rouge to the mouth of the River handled 188,907,286 tons. That includes only foreign commerce. It does not include the large amount of domestic commerce that uses the Mississippi River and the various ports on the River. In 2010, the state of Louisiana ports handled over 238 million tons of domestic waterborne commerce (Source: U.S. Army Corps of Engineers, Navigation Data Center, 2010). According to the USACE, the ports of the Lower Mississippi River handled 18.3% of all U. S. waterborne commerce, both foreign and domestic.

The importance of the Mississippi River system is even more telling when analyzing specific commodities. Table 1 presents the total for certain commodities according to the USACE in the New Orleans District, the country as a whole, and the percentage of the national total that uses the New Orleans District. The nation relies on the Mississippi River for a great deal of the movement of crude oil, chemical products, coal and ores, and certain grain and other agricultural crops. Table 1 indicates that the River is vital to the future of the 343.5 million acres of agricultural lands along the MRT, especially for corn, soybeans, rice, and vegetable oil cargoes. A large amount of other bulk products are also moved on the MRT, including substantial amounts of crude oil, pig iron and coal.

Table 1

Commodity Movements in Foreign Commerce, 2010
(in Short Tons)

Commodity	U.S. Total	LMR Total	LMR as a % of U.S.
Coal	94,537,000	9,731,923	10.3%
Crude Oil	448,198,000	25,642,895	5.7%
Gasoline	69,053,000	3,722,836	5.4%
Distillate Fuel Oil	111,839,000	22,674,089	20.3%
Petroleum Coke	36,176,000	5,351,526	14.8%
Fertilizer	21,927,000	6,507,626	29.7%
Other Chemical Products	86,550,000	10,750,698	12.4%
Iron Ore and Scrap	33,729,000	3,684,935	10.9%
Aluminum Ore	14,517,000	3,930,165	27.1%
Pig Iron	4,440,000	2,941,286	66.2%
Wheat	29,656,000	4,528,269	15.3%
Corn	48,273,000	32,571,978	67.5%
Rice	4,710,000	2,409,356	51.2%
Soybeans	43,796,000	25,327,265	57.8%
Animal Feed Prep	8,847,000	4,006,023	45.3%
Total Listed Commodities	1,056,248,000	163,780,870	15.5%
All Commodities	1,440,937,396	188,907,286	13.1%

Source: U. S. Army Corps of Engineer, Waterborne Statistics of the United States, 2010

Clearly, this can and will be enhanced by the opening of the expanded Panama Canal. Due for completion in the summer of 2015, the widening of the Canal will bring large changes to the shipping industry in the United States and the world. The Panama Canal will be wider and deeper, designed to accommodate larger vessels. By taking advantage of economies of scale, shippers can save costs by using larger and larger vessels. Currently, vessels using the Panama Canal are limited to maximum drafts of approximately 39.5 feet. The new Canal's maximum operational draft for transiting vessels will be increased to 50 feet. In order to take advantage of full cargoes on the new larger vessels that will be increasingly used in the future, the Lower Mississippi River

must be deepened to 50 feet. Southwest Pass, the navigable deep-draft entrance to the River, is currently effectively maintained to allow a depth of 47 feet.

The costs of deepening the Mississippi River passes to accommodate 50-foot vessels has been estimated at $300 million for the initial channel deepening and $90 million in addition to the current spending for annual maintenance deepening. Clearly, if this effort to dredge the Mississippi River to 50 feet is going to be undertaken, the benefits to the citizens of the United States must outweigh the additional costs of deepening. The purpose of this study is to estimate the economic impact of deepening the Mississippi River to accommodate vessels of 50-foot draft.

The Lower Mississippi River (LMR) deepening was approved by Congress in the Water Resources Development Act of 1986 to a depth of 55 feet. However, because of the heavy financial burden on the non-Federal sponsor this deepening has never been undertaken. In the last few years in an effort to revive the LMR deepening and to match the ultimate draft with that of the expanded Panama Canal Locks, key members of the navigation industry have agreed to an amended channel depth that would accommodate vessels with a maximum draft of 50 feet.

THE ECONOMIC IMPACT OF DEEPENING THE MISSISSIPPI RIVER TO 50 FEET

This section of the report identifies the gain in cargo capacity that can be expected as a result of the increased maximum draft to 50 feet. The base year of the study is 2011. The study uses 2011 data to estimate the impact of the increased draft. In order to estimate the economic impact of deepening the River to 50 feet, we must first try to determine the cargoes that will be affected. According to national studies of the impact of the new Panama Canal locks, the most impacted cargoes will be containerized cargoes of all sorts. The increase in container ship sizes is expected to have a small impact on the Lower Mississippi River even if the River is dredged to 50 feet. According to these same studies, including the Corps' Institute of Water Resources, the widening of the Panama Canal is likely to heavily impact bulk cargoes such as crude oil, coal, pig iron, and grain as it relates to Mississippi River. The U. S. Army Corps of Engineers' Institute for Water Resources confirmed this in an August 2012 memo, stating, "IWR agrees that Port & Inland Waterways Modernization report could have considered deepening channels on the Gulf coast to primarily serve post-Panamax bulk vessels." (Source: USACE Institute of Water Resources, "Memorandum for the Record, 'Response to Comments from Big River Coalition,'" August 24, 2012) Given the data in Table 1, this is not surprising.

The first step in estimating the impact of the new dimensions on the Panama Canal is to determine which commodities will likely be affected by the change. Clearly not all commodities require large vessels and deep draft. Tables 2 and 3 present the 2011 data on ship movements and commodities carried by tonnage of vessel. The Tables clearly point out that commodity movements on the Lower Mississippi River are dominated by a few commodities. On the import side, the top 20 commodities account for 95.1% of all tonnage and the top 10 commodities account for 90.9% of total tonnage. On the export side, the same patterns holds. The top 20 commodities account for 90.5% of all export tonnage and the top 10 account for 83.3% of all tonnage. It is these commodities that will be impacted by the increased lock dimensions.

Table 2

Top 20 Commodity Exports on the
Lower Mississippi River, 2011

Commodity	Short Tons
Corn	31,520,975
Soybeans	24,882,896
Coal	24,711,728
Crude Oil	16,689,461
Vegetables	3,635,156
Pet and Animal Feed	3,587,410
Rice	1,706,403
Pig Iron	1,424,214
Gasoline	1,406,580
Cyanide Hydroxide	1,333,335
Iron Ore	1,088,279
Coke	999,769
Soybean Oil	691,066
General Cargo	442,481
Corn Oil	359,912
Vinyl Alcohol	359,893
Mineral Oil	350,144
Toluene, etc.	321,186
Frozen Poultry	313,361
Paper Products	303,112
Total Top 20	**116,127,359**
Total All Commodities	122,048,141

Source: PIERS, 2011

Table 3

Top 20 Commodity Imports on the
Lower Mississippi River, 2011

Commodity	Short Tons
Crude Oil	82,467,786
Bauxite	3,941,854
Urea, Slag Fertilizer	3,935,230
Pig Iron	3,202,101
Phosphate	2,824,478
Kerosene	2,377,959
Nitrogen Fertilizer	1,895,211
Fusel	1,884,145
Iron Ore	1,809,014
Limestone Chips	1,641,126
Potassium Chloride	1,519,798
Ferrochrome	1,368,995
Gasoline	1,004,829
Steel Wire Rods	933,666
Barium Sulfate	901,375
General Cargo	887,579
Coal	714,586
Bulk Fertilizer	682,942
Grocery Products	620,519
Aluminum Compounds	535,767
	115,148,959
Total All Commodities	127,183,903

Source: PIERS, 2011

Further, many commodities on both the export side and the import side, even including the top 20 commodity groups, are carried in mixed-shipment loads that are less than the maximum capacity of current Panamax vessels. In round numbers, a Panamax vessel can carry a load of approximately 75,000 tons. Most ships carrying cargo up and down the Lower Mississippi River carry loads less than 75,000 tons. It is safe to say that these movements would not be impacted by the increased dimensions of the future Panama Canal and the building of larger vessels, at least not for years to come. Tables 4 and 5 present the actual distribution of shiploads on the export and import side for 2011.

Table 4

Export Vessels 2011

Vessel Size	Number of Vessels	Percent
Less Than 50,000 tons	2,571	70.2%
Between 50,000 & 60,000	312	8.5%
Between 60,000 & 70,000	466	12.7%
Between 70,000 & 80,000	219	6.0%
Between 80,000 & 90,000	62	1.7%
Between 90,000 & 100,000	18	0.5%
Between 100,000 and 110,000	7	0.2%
Over 110,000	6	0.2%
Total	**3,661**	**100.0%**

Source: PIERS, 2011

Table 5

Import Vessels, 2011

Vessel Tonnage	Number of Vessels	Percent
Less Than 50,000 tons	2,085	68.7%
Between 50,000 & 60,000	170	5.6%
Between 60,000 & 70,000	173	5.7%
Between 70,000 & 80,000	185	6.1%
Between 80,000 & 90,000	121	4.0%
Between 90,000 & 100,000	50	1.6%
Between 100,000 and 110,000	32	1.1%
Over 110,000	217	7.2%
Total	**3,033**	**100.0%**

Source: PIERS, 2011

As the Tables indicate, on the export side, only 2.6% of all vessels currently carry a load above 80,000 tons and 13.9% on the import side. Those commodities that are currently carried in ships with loads less than 75,000 tons will not be impacted by the new lock dimensions of the Panama Canal. The remaining commodities will however be impacted by the increased lock size.

Maritime officials along the LMR, including Port of New Orleans Director Gary Lagrange, have predicted that the new Panama Canal would increase tonnage on the LMR by 12%. Based on the total tonnage moved on the LMR in 2011 of 249.23 million tons, a 12% increase would project an increase of 29.91 million tons. In order to be conservative, this study discounts that total by 20% to arrive at a projected increase of 24.36 million tons.

The 24.36 million ton impact of deepening the River to 50 feet will occur in two ways: first, current vessels will be able to carry larger loads and second, we will expect larger and larger vessels will be used to carry cargo through the Lower Mississippi River. In 2011, the base year of this study, there were several long periods that required draft restrictions down to 43 feet during the period with the most shoaling. These restrictions were exceptions due to inadequate funding. In years past the River was dredged to an average depth that allowed 47 feet of draft. Increasing the draft will allow existing ships

to accommodate additional cargo. The study projects an increase in draft of three feet on average for existing vessels if the River is dredged to 50 feet.

This study assumes a gradual increase in the number of post-Panamax and Cape Size vessels using the LMR starting in 2017 and reaching a steady state in 2024, a period of eight years. The increase in the number of large ships is estimated calculating the increase that will be necessary to produce the overall 24.36 million ton increase in total cargo when coupled with the increased loads on existing vessels. Based on that calculation, the number of vessels that can handle more than 75,000 tons of cargo will increase by 2% the first year, 5% the second year, 8% the third year, 11% the fourth year, 13% the fifth year, 14% the sixth year, 16% the seventh year, and 18% the eighth year. Thus, by 2024 we assume that there will be 18% more large ships carrying the top ten commodities than we had in 2011.

Table 6 presents the data on the number of ships currently carrying over 75,000 tons by commodity. In 2011, 714 of the 6,694 vessels trips carried more than 75,000 tons of cargo. The largest number of the plus 75,000-ton voyages carried crude oil, coal, and grains. It is these commodities that will provide the base for the estimation of the economic impact of deepening the Lower Mississippi River to 50 feet.

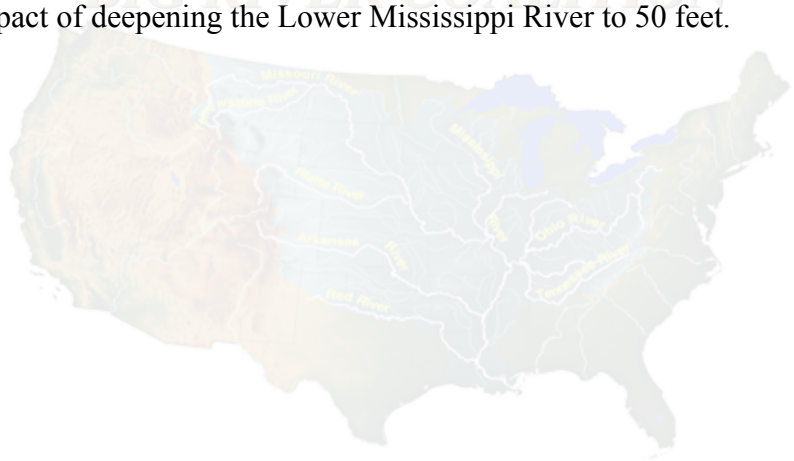


Table 6

Commodities Carried by Vessels Greater than 75,000 Tons

Commodity	Number of Vessels
Imports:	
Crude Oil	527
Pig Iron	15
Iron Ore	5
Gasoline	3
Sub-Total Imports	**550**
Exports:	
Corn	9
Soybeans	14
Coal	117
Crude Oil	20
Pig Iron	2
Iron Ore	2
Sub-Total Exports	**164**
Grand Total	**714**

Source: PIERS, 2011

Based on the ten commodities in Table 6, we can estimate the economic impact of deepening the Mississippi River to 50 feet. The first step is to estimate the increase tonnage by commodity. Table 7 presents the increased tonnage due to increased loads of existing vessels and increased number of large vessels using the LMR.

Table 7

Increased Tonnage Due to Deepening the LMR to 50 Feet

Year 1	Tonnage		
Commodity	Tons from Existing	Tons from New Ships	Total Tons
Imports:			
Petroleum	3,190,104	1,595,052	4,785,156
Pig Iron	73,884	123,139	197,023
Iron Ore	24,628	123,139	147,767
Gasoline	14,777	123,139	137,916
Sub-Total Imports	**3,303,392**	**1,964,470**	**5,267,861**
Exports:			
Corn	54,480	151,333	205,813
Soybeans	68,958	151,333	220,291
Coal	708,239	354,120	1,062,359
Crude Oil	121,067	151,333	272,400
Pig Iron	9,851	123,139	132,990
Iron Ore	9,851	123,139	132,990
Sub-Total Exports	**972,446**	**1,054,398**	**2,026,844**
Grand Total	**4,275,838**	**3,018,867**	**7,294,705**

Year 2	Tonnage		
Commodity	Tons from Existing	Tons from New Ships	Total Tons
Imports:			
Petroleum	3,190,104	3,987,630	7,177,734
Pig Iron	73,884	92,354	166,238
Iron Ore	24,628	123,139	147,767
Gasoline	14,777	123,139	137,916
Sub-Total Imports	3,303,392	4,326,263	**7,629,655**

Table 7 (Continued)

Exports:			
Corn	54,480	151,333	205,813
Soybeans	68,958	105,933	174,891
Coal	708,239	885,299	1,593,539
Crude Oil	121,067	151,333	272,400
Pig Iron	9,851	123,139	132,990
Iron Ore	9,851	123,139	132,990
Sub-Total Exports	972,446	1,540,177	**2,512,623**
Grand Total	4,275,838	5,866,440	**10,142,278**

Year 3	Tonnage		
Commodity	Tons from Existing	Tons from New Ships	Total Tons
Imports:			
Petroleum	3,190,104	6,380,208	9,570,312
Pig Iron	73,884	147,767	221,651
Iron Ore	24,628	123,139	147,767
Gasoline	14,777	123,139	137,916
Sub-Total Imports	3,303,392	6,774,253	**10,077,645**
Exports:			
Corn	54,480	151,333	205,813
Soybeans	68,958	169,493	238,451
Coal	708,239	1,416,479	2,124,718
Crude Oil	121,067	242,133	363,200
Pig Iron	9,851	123,139	132,990
Iron Ore	9,851	123,139	132,990
Sub-Total Exports	972,446	2,225,717	**3,198,163**
Grand Total	4,275,838	8,999,970	**13,275,808**

Table 7 (Continued)

Year 4	Tonnage		
Commodity	Tons from Existing	Tons from New Ships	Total Tons
Imports:			
Petroleum	3,190,104	8,772,786	11,962,889
Pig Iron	73,884	203,180	277,063
Iron Ore	24,628	246,278	270,906
Gasoline	14,777	246,278	261,055
Sub-Total Imports	3,303,392	9,468,522	**12,771,914**
Exports:			
Corn	54,480	302,666	357,146
Soybeans	68,958	233,053	302,011
Coal	708,239	1,947,658	2,655,898
Crude Oil	121,067	332,933	454,000
Pig Iron	9,851	246,278	256,130
Iron Ore	9,851	246,278	256,130
Sub-Total Exports	972,446	3,308,868	**4,281,314**
Grand Total	4,275,838	12,777,390	**17,053,228**

Year 5	Tonnage		
Commodity	Tons from Existing	Tons from New Ships	Total Tons
Imports:			
Petroleum	3,190,104	10,367,838	13,557,941
Pig Iron	73,884	240,121	314,005
Iron Ore	24,628	246,278	270,906
Gasoline	14,777	246,278	261,055
Sub-Total Imports	3,303,392	11,100,516	**14,403,908**

Table 7 (Continued)

Exports:			
Corn	54,480	302,666	357,146
Soybeans	68,958	275,426	344,384
Coal	708,239	2,301,778	3,010,017
Crude Oil	121,067	393,466	514,533
Pig Iron	9,851	246,278	256,130
Iron Ore	9,851	246,278	256,130
Sub-Total Exports	972,446	3,765,894	**4,738,340**
Grand Total	4,275,838	14,866,410	**19,142,248**

Year 6	Tonnage		
Commodity	Tons from Existing	Tons from New Ships	Total Tons
Imports:			
Petroleum	3,190,104	11,165,363	14,355,467
Pig Iron	73,884	258,592	332,476
Iron Ore	24,628	246,278	270,906
Gasoline	14,777	246,278	261,055
Sub-Total Imports	3,303,392	11,916,513	**15,219,905**
Exports:			
Corn	54,480	302,666	357,146
Soybeans	68,958	296,613	365,571
Coal	708,239	2,478,838	3,187,077
Crude Oil	121,067	423,733	544,800
Pig Iron	9,851	246,278	256,130
Iron Ore	9,851	246,278	256,130
Sub-Total Exports	972,446	3,994,407	**4,966,853**
Grand Total	4,275,838	15,910,920	**20,186,758**

Table 7 (Continued)

Year 7	Tonnage		
Commodity	Tons from Existing	Tons from New Ships	Total Tons
Imports:			
Petroleum	3,190,104	12,760,415	15,950,519
Pig Iron	73,884	295,534	369,418
Iron Ore	24,628	246,278	270,906
Gasoline	14,777	246,278	261,055
Sub-Total Imports	3,303,392	13,548,506	**16,851,898**
Exports:			
Corn	54,480	302,666	357,146
Soybeans	68,958	338,986	407,944
Coal	708,239	2,832,958	3,541,197
Crude Oil	121,067	484,266	605,333
Pig Iron	9,851	246,278	256,130
Iron Ore	9,851	246,278	256,130
Sub-Total Exports	972,446	4,451,433	**5,423,879**
Grand Total	4,275,838	17,999,940	**22,275,778**

Table 7 (Continued)

Year 8	Tonnage		
Commodity	Tons from Existing	Tons from New Ships	Total Tons
Imports:			
Petroleum	3,190,104	14,355,467	17,545,571
Pig Iron	73,884	332,476	406,359
Iron Ore	24,628	246,278	270,906
Gasoline	14,777	246,278	261,055
Sub-Total Imports	3,303,392	15,180,500	**18,483,892**
Exports:			
Corn	54,480	302,666	357,146
Soybeans	68,958	381,360	450,318
Coal	708,239	3,187,077	3,895,317
Crude Oil	121,067	544,800	665,866
Pig Iron	9,851	246,278	256,130
Iron Ore	9,851	246,278	256,130
Sub-Total Exports	972,446	4,908,460	**5,880,906**
Grand Total	4,275,838	20,088,960	**24,364,798**

Source: Author's Calculations

The next step is to estimate the total value of the increased cargoes that will be facilitated by the increased deepening of the LMR. The increased tonnages for each commodity estimated in Table 7 are multiplied by the average wholesale price for that commodity to produce the estimate for the increased value of that commodity created by the deepening of the LMR. Wholesale prices for the commodities estimated in this report were provided by Bluewater Shipping (based on actual bills of lading) and the U. S. Energy Information Agency for crude oil prices. The result is the increase in value that will be created by the increased deepening. Table 8 presents the results.

Table 8

Increased Values Due to Deepening the LMR to 50 Feet

Year 1	Value		
Commodity	Value from Existing Ships	Value from New Ships	Total Value
Imports:			
Petroleum	$2,404,287,487	$1,202,143,744	$3,606,431,231
Pig Iron	$36,941,760	$61,569,600	$98,511,360
Iron Ore	$3,444,696	$17,223,480	$20,668,176
Gasoline	$18,742,219	$156,185,155	$174,927,374
Sub-Total Imports	**$2,463,416,162**	**$1,437,121,979**	**$3,900,538,140**
Exports:			
Corn	$14,900,267	$41,389,630	$56,289,897
Soybeans	$36,892,504	$80,963,262	$117,855,766
Coal	$212,471,813	$106,235,906	$318,707,719
Crude Oil	$91,244,307	$114,055,384	$205,299,691
Pig Iron	$4,925,568	$61,569,600	$66,495,168
Iron Ore	$12,494,812	$156,185,155	$168,679,968
Sub-Total Exports	**$372,929,271**	**$560,398,937**	**$933,328,209**
Grand Total	**$2,836,345,433**	**$1,997,520,916**	**$4,833,866,349**

Year 2	Value		
Commodity	Value from Existing Ships	Value from New Ships	Total Value
Imports:			
Petroleum	$2,404,287,487	$3,005,359,359	$5,409,646,846
Pig Iron	$36,941,760	$46,177,200	$83,118,960
Iron Ore	$3,444,696	$17,223,480	$20,668,176
Gasoline	$18,742,219	$156,185,155	$174,927,374
Sub-Total Imports	**$2,463,416,162**	**$3,224,945,194**	**$5,688,361,356**

Table 8 (Continued)

Exports:			
Corn	$14,900,267	$41,389,630	$56,289,897
Soybeans	$36,892,504	$56,674,283	$93,566,788
Coal	$212,471,813	$265,589,766	$478,061,579
Crude Oil	$91,244,307	$114,055,384	$205,299,691
Pig Iron	$4,925,568	$61,569,600	$66,495,168
Iron Ore	$12,494,812	$156,185,155	$168,679,968
Sub-Total Exports	**$372,929,271**	**$695,463,818**	**$1,068,393,090**
Grand Total	**$2,836,345,433**	**$3,920,409,012**	**$6,756,754,446**

Year 3	Value		
Commodity	Value from Existing Ships	Value from New Ships	Total Value
Imports:			
Petroleum	$2,404,287,487	$4,808,574,974	$7,212,862,462
Pig Iron	$36,941,760	$73,883,520	$110,825,280
Iron Ore	$3,444,696	$17,223,480	$20,668,176
Gasoline	$18,742,219	$156,185,155	$174,927,374
Sub-Total Imports	**$2,463,416,162**	**$5,055,867,129**	**$7,519,283,291**
Exports:			
Corn	$14,900,267	$41,389,630	$56,289,897
Soybeans	$36,892,504	$90,678,853	$127,571,358
Coal	$212,471,813	$424,943,626	$637,415,438
Crude Oil	$91,244,307	$182,488,614	$273,732,921
Pig Iron	$4,925,568	$61,569,600	$66,495,168
Iron Ore	$12,494,812	$156,185,155	$168,679,968
Sub-Total Exports	**$372,929,271**	**$957,255,478**	**$1,330,184,750**
Grand Total	**$2,836,345,433**	**$6,013,122,608**	**$8,849,468,041**

Table 8 (Continued)

Year 4	Value		
Commodity	Value from Existing Ships	Value from New Ships	Total Value
Imports:			
Petroleum	$2,404,287,487	$6,611,790,590	$9,016,078,077
Pig Iron	$36,941,760	$101,589,840	$138,531,600
Iron Ore	$3,444,696	$34,446,960	$37,891,656
Gasoline	$18,742,219	$312,370,310	$331,112,529
Sub-Total Imports	**$2,463,416,162**	**$7,060,197,700**	**$9,523,613,862**
Exports:			
Corn	$14,900,267	$82,779,260	$97,679,527
Soybeans	$36,892,504	$124,683,423	$161,575,928
Coal	$212,471,813	$584,297,485	$796,769,298
Crude Oil	$91,244,307	$250,921,844	$342,166,151
Pig Iron	$4,925,568	$123,139,200	$128,064,768
Iron Ore	$12,494,812	$312,370,310	$324,865,123
Sub-Total Exports	**$372,929,271**	**$1,478,191,523**	**$1,851,120,795**
Grand Total	**$2,836,345,433**	**$8,538,389,223**	**$11,374,734,656**

Year 5	Value		
Commodity	Value from Existing Ships	Value from New Ships	Total Value
Imports:			
Petroleum	$2,404,287,487	$7,813,934,333	$10,218,221,821
Pig Iron	$36,941,760	$120,060,720	$157,002,480
Iron Ore	$3,444,696	$34,446,960	$37,891,656
Gasoline	$18,742,219	$312,370,310	$331,112,529
Sub-Total Imports	**$2,463,416,162**	**$8,280,812,324**	**$10,744,228,485**

Table 8 (Continued)

Exports:			
Corn	$14,900,267	$82,779,260	$97,679,527
Soybeans	$36,892,504	$147,353,137	$184,245,641
Coal	$212,471,813	$690,533,392	$903,005,204
Crude Oil	$91,244,307	$296,543,997	$387,788,304
Pig Iron	$4,925,568	$123,139,200	$128,064,768
Iron Ore	$12,494,812	$312,370,310	$324,865,123
Sub-Total Exports	**$372,929,271**	**$1,652,719,297**	**$2,025,648,568**
Grand Total	**$2,836,345,433**	**$9,933,531,620**	**$12,769,877,053**

Year 6	Value		
Commodity	Value from Existing Ships	Value from New Ships	Total Value
Imports:			
Petroleum	$2,404,287,487	$8,415,006,205	$10,819,293,692
Pig Iron	$36,941,760	$129,296,160	$166,237,920
Iron Ore	$3,444,696	$34,446,960	$37,891,656
Gasoline	$18,742,219	$312,370,310	$331,112,529
Sub-Total Imports	**$2,463,416,162**	**$8,891,119,635**	**$11,354,535,797**
Exports:			
Corn	$14,900,267	$82,779,260	$97,679,527
Soybeans	$36,892,504	$158,687,994	$195,580,498
Coal	$212,471,813	$743,651,345	$956,123,158
Crude Oil	$91,244,307	$319,355,074	$410,599,381
Pig Iron	$4,925,568	$123,139,200	$128,064,768
Iron Ore	$12,494,812	$312,370,310	$324,865,123
Sub-Total Exports	**$372,929,271**	**$1,739,983,183**	**$2,112,912,455**
Grand Total	**$2,836,345,433**	**$10,631,102,819**	**$13,467,448,252**

Table 8 (Continued)

Year 7	Value		
Commodity	Value from Existing Ships	Value from New Ships	Total Value
Imports:			
Petroleum	$2,404,287,487	$9,617,149,949	$12,021,437,436
Pig Iron	$36,941,760	$147,767,040	$184,708,800
Iron Ore	$3,444,696	$34,446,960	$37,891,656
Gasoline	$18,742,219	$312,370,310	$331,112,529
Sub-Total Imports	**$2,463,416,162**	**$10,111,734,259**	**$12,575,150,421**
Exports:			
Corn	$14,900,267	$82,779,260	$97,679,527
Soybeans	$36,892,504	$181,357,707	$218,250,211
Coal	$212,471,813	$849,887,251	$1,062,359,064
Crude Oil	$91,244,307	$364,977,228	$456,221,535
Pig Iron	$4,925,568	$123,139,200	$128,064,768
Iron Ore	$12,494,812	$312,370,310	$324,865,123
Sub-Total Exports	**$372,929,271**	**$1,914,510,956**	**$2,287,440,228**
Grand Total	**$2,836,345,433**	**$12,026,245,215**	**$14,862,590,648**

Table 8 (Continued)

Year 8	Value		
Commodity	Value from Existing Ships	Value from New Ships	Total Value
Imports:			
Petroleum	$2,404,287,487	$10,819,293,692	$13,223,581,180
Pig Iron	$36,941,760	$166,237,920	$203,179,680
Iron Ore	$3,444,696	$34,446,960	$37,891,656
Gasoline	$18,742,219	$312,370,310	$331,112,529
Sub-Total Imports	**$2,463,416,162**	**$11,332,348,883**	**$13,795,765,044**
Exports:			
Corn	$14,900,267	$82,779,260	$97,679,527
Soybeans	$36,892,504	$204,027,420	$240,919,925
Coal	$212,471,813	$956,123,158	$1,168,594,970
Crude Oil	$91,244,307	$410,599,381	$501,843,688
Pig Iron	$4,925,568	$123,139,200	$128,064,768
Iron Ore	$12,494,812	$312,370,310	$324,865,123
Sub-Total Exports	**$372,929,271**	**$2,089,038,730**	**$2,461,968,001**
Grand Total	**$2,836,345,433**	**$13,421,387,612**	**$16,257,733,045**

Source: Author's Calculations

Table 9 presents a year-by-year summary of the data in Tables 7 and 8. Thus, at the end of the eight-year period, the deepening of the Lower Mississippi River to 50 feet will accommodate an increase of 24.36 million tons of cargo, valued at $16.26 billion. Once all effects are fully phased in, the total increase in cargo volumes related to the proposed deepening of the MRT will create an increase of 9.8% of 2011 cargo movements. This is a very conservative estimate and indicates that the deepening of the MRT creates significant economic value at relatively low increases in cargo movements.

Table 9

Summary of Increase Tonnage and Values Created
by Deepening the LMR to 50 Feet

Year	Tonnage	Percent of 2011	Value
2017	7,294,705	2.9%	$4,833,866,349
2018	10,142,278	4.1%	$6,756,754,446
2019	13,275,808	5.3%	$8,849,468,041
2020	17,053,228	6.8%	$11,374,734,656
2021	19,142,248	7.7%	$12,769,877,053
2022	20,186,758	8.1%	$13,467,448,252
2023	22,275,778	8.9%	$14,862,590,648
2024	24,364,798	9.8%	$16,257,733,045

Source: Author's Calculations

Figures 1 and 2 present the final percentage increases from 2011 to 2024 (when all effects are fully phased in) in the major commodities under consideration in this report. The percentage increases are relatively small and indicate the conservative nature of this report.

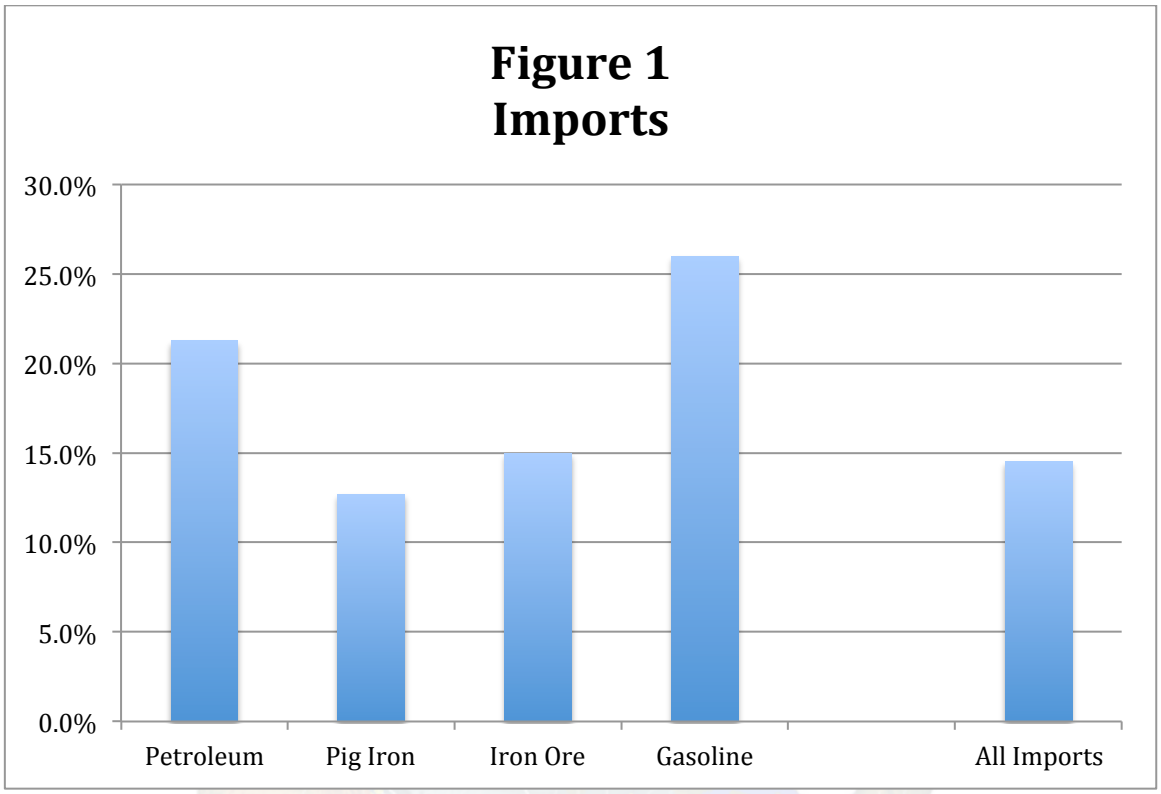


Figure 1
Imports
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
Petroleum
Pig Iron
Iron Ore
Gasoline
All Imports

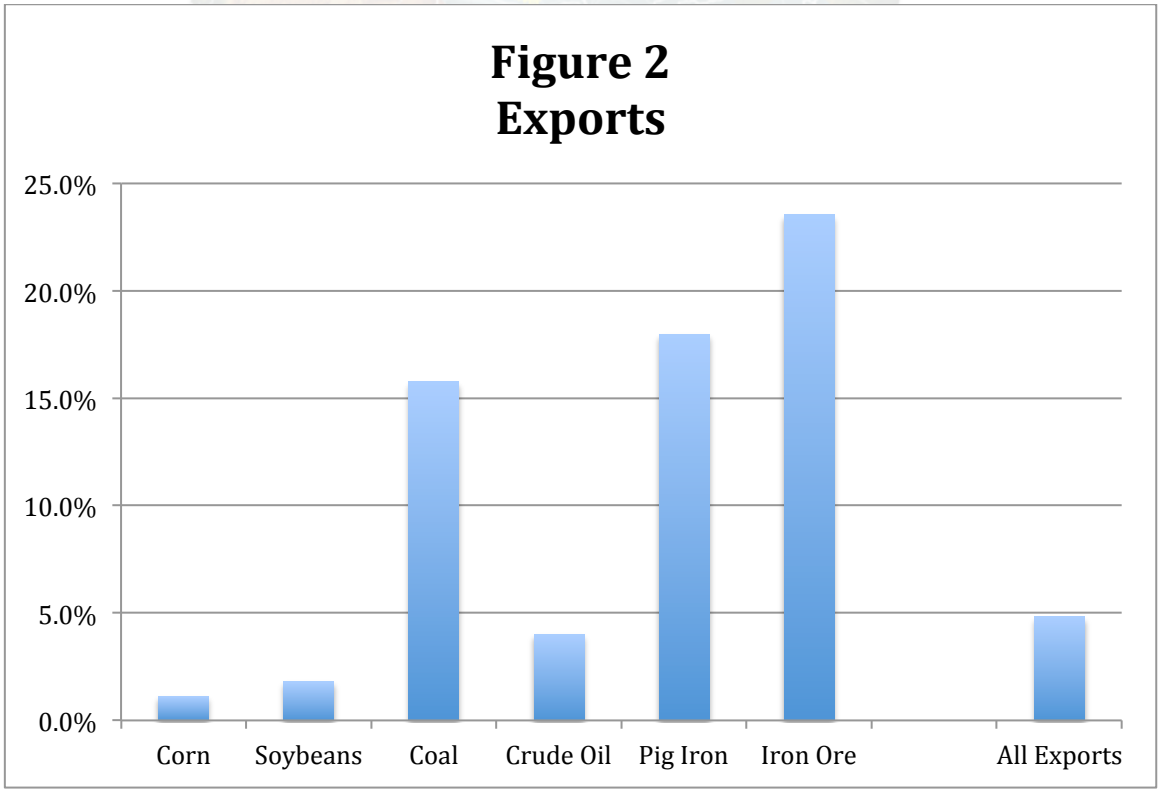


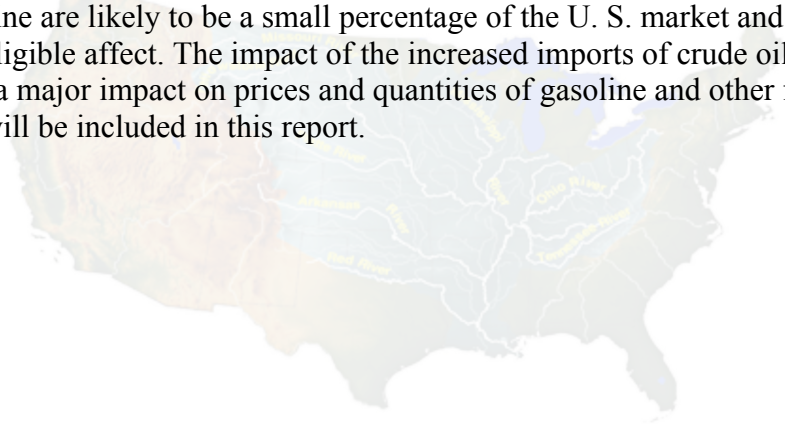
Figure 2
Exports
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
Corn
Soybeans
Coal
Crude Oil
Pig Iron
Iron Ore
All Exports

The final step is to estimate the economic impact of the potential increased tonnage in Table 9. There are three separate aspects of the economic impact of the increased movement of cargoes through the Lower Mississippi River:

1. The first is the impact of the shipping and related transportation services on the Louisiana economy.

2. The second is the impact of increased production of goods in the United States as a result of the increased exports that the increased depths will provide. The economic assumption made is that the world market is very large and the lower water transportation costs associated with the deeper drafts will allow U. S. farmers and other producers to increase their sales in the export market. The increased sales will result from increased production and thus have a positive impact on the producing areas.

3. The final impact considers the lowering of prices and resulting increased demand for U. S. products using raw materials whose costs have been reduced by the lower transportation costs. Although this analysis will impact products using all four of the targeted import commodities, the impacts on pig iron, iron ore, and gasoline are likely to be a small percentage of the U. S. market and therefore have a negligible affect. The impact of the increased imports of crude oil however will have a major impact on prices and quantities of gasoline and other fuel purchases and will be included in this report.



THE ECONOMIC IMPACT TO THE LOUISIANA ECONOMY

This section of the report identifies the potential impact on the Louisiana economy as a result of the increased deepening. Shipping is a large part of the Louisiana economy. As reported earlier, over 20% of United States waterborne commerce passes through the Lower Mississippi River and the Louisiana economy. Shipping is big business in Louisiana. Those millions of tons of cargo just don't pass through the River without leaving a mark on the local economy. Millions of dollars of business and thousands of jobs are related to the handling, financing, processing, and transporting that cargo.

The ship movements create a large number of economic opportunities related to the servicing of the vessels that call on the ports along the River. The LMR also acts as a magnet for attracting warehousing and manufacturing firms that use the River to import raw materials into the area or export finished products out of the area.

Hundreds of firms are located in the New Orleans area simply because of the existence of the maritime industry. These firms include large steamship agencies; firms providing longshoremen and stevedoring services; railroads, tugboat, barge, and trucking companies that ship the goods to and from the port; freight forwarding companies; law firms that hire maritime attorneys to handle legal work for the maritime industry; and insurance companies that write marine insurance. These firms are referred to as the port industry, which includes the following kinds of businesses:

1. The Ports themselves. There are five port authorities along the LMR. They operate and manage the public facilities, and spend money for operating expenses and capital projects and are thus part of the economic impact.

2. The companies engaged in ocean-going transportation -- i.e., the steamship companies.

3. Ship services:
    a. Navigational services;
    b. Cargo-handling facilities;
    c. Customs and other government;
    d. Stevedoring (loading and unloading cargo);
    e. Ship's agents;
    f. Ship supplies;
    g. Ship repair;
    h. Cargo packing;
    i. Freight forwarding;
    j. Marine insurance;
    k. Custom house brokers; and
    l. Other ship services.

4. Inland transportation:

    a. Railroads;
    b. Barge lines;
    c. Other River transportation;
    d. Short-haul truck transportation (drayage); and
    e. Long-haul truck transportation.

In addition to the port industry identified above, many firms use the port as a means of transporting raw materials and finished products. These include warehouses that store goods for export or import and manufacturing firms that locate in the New Orleans area and in Louisiana because they need the Mississippi River and the port to transport their goods out of the country or to more populated regions of the United States. These firms are referred to as port users.

The economic impact as estimated in this study is made up of three components: the direct, or primary, spending; the indirect spending; and the induced spending. The direct spending is the initial increase in output, or total spending, of the port industry and port users.

This direct or primary spending produces additional spending in the economy, referred to as indirect and induced spending or the economic multiplier effect. Indirect spending includes the spending of local firms that provide inputs or supplies to the firms involved in the direct spending. The induced spending is a result of the income produced in the local area by the direct and indirect spending. When these dollars are spent, they produce income for someone else in the local economy. The recipients of that income then spend part of their new income in the local economy, thus producing income for still other local residents. The process continues to third, fourth, and further rounds of spending.

The indirect and induced spending are added together to produce secondary spending. The secondary spending is sometimes referred to as the "ripple effect" or the multiplier effect. The multipliers used in this study are calculated by the Bureau of Economic Analysis, U.S. Department of Commerce (Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II), Washington: U.S. Government Printing Office, 2010). The multipliers are industry specific. Thus, each area of spending -- i.e., spending on wages and salaries, ship repair, ship services, manufacturing, etc. -- has a different multiplier. The BEA study cited above also estimates multipliers for earnings and employment related to the direct spending in each industry.

Using the estimated increased tonnages contained in Table 9, we can estimate the economic impact to the Louisiana economy. In 2012, Dr. James Richardson, Professor of Economics at LSU, authored a study of the Economic Impact of the Ports of Louisiana (Source: Dr. James A. Richardson, The Economic Impact of the Ports of Louisiana, 2012.

http://portsoflouisiana.org/wp-content/uploads/2012-final-report.pdf). In that study, Dr. Richardson estimated the marginal impact of increased tonnage moving through Louisiana Ports. Those marginal impacts were multiplied by the increased tonnage to produce the economic impact of increased deepening on the Louisiana economy.

Table 10 presents the total impact on the Louisiana economy per 1,000 tons of cargo shipped (or not shipped) through the Mississippi River. For every 1,000 tons of cargo gained due to the deepening, the local economy will gain $14,691 in spending on ship services (loading, unloading, freight forwarding, dockage, etc.); inland transportation; and increased business for port users, mostly manufacturing firms. This gain in direct spending creates additional impacts in the local economy in secondary spending, sometimes referred to as the "ripple effect," total spending (direct plus secondary spending), earnings of affected workers, jobs, and tax revenues for local, state, and federal governments.

Table 10

Economic Impact of Increased Cargo Movements
through Louisiana Ports per 1,000 Tons of Cargo

Category	Impact
Direct Spending	$6,026.37
Secondary Spending	$4,743.33
Total Spending	$10,769.70
Earnings	$2,060.63
Jobs	0.04
State Taxes	$147.74
Local Taxes	$116.64
Federal Taxes	$227.91
S & L Taxes	$264.38
Total Taxes	$492.29

Source: James A. Richardson and Author's Calculations

To estimate the total impact that would be created by the increase in channel depths, the per 1,000 ton impacts (in Table 10) are multiplied by the total increased tonnage (as reported in Tables 9) divided by 1,000. Table 11 presents these estimates.

Table 11

Economic Impact of Increased Cargo Movements
Resulting from Deepening the LMR to 50 Feet
(in Millions of $s)

Category	2017	2018	2019	2020
Direct Spending	$43.96	$61.12	$80.00	$102.77
Secondary Spending	$34.60	$48.11	$62.97	$80.89
Total Spending	$78.56	$109.23	$142.98	$183.66
Earnings	$15.03	$20.90	$27.36	$35.14
Jobs	272	378	495	636
State Taxes	$1.08	$1.50	$1.96	$2.52
Local Taxes	$0.85	$1.18	$1.55	$1.99
Federal Taxes	$1.66	$2.31	$3.03	$3.89
S & L Taxes	$1.93	$2.68	$3.51	$4.51
Total Taxes	$3.59	$4.99	$6.54	$8.40

Source: James A. Richardson and Author's Calculations

Table 11 (Continued)

Economic Impact of Increased Cargo Movements
Resulting from Deepening the LMR to 50 Feet
(in Millions of $s)

Category	2021	2022	2023	2024
Direct Spending	$115.36	$121.65	$134.24	$146.83
Secondary Spending	$90.80	$95.75	$105.66	$115.57
Total Spending	$206.16	$217.41	$239.90	$262.40
Earnings	$39.45	$41.60	$45.90	$50.21
Jobs	714	753	831	908
State Taxes	$2.83	$2.98	$3.29	$3.60
Local Taxes	$2.23	$2.35	$2.60	$2.84
Federal Taxes	$4.36	$4.60	$5.08	$5.55
S & L Taxes	$5.06	$5.34	$5.89	$6.44
Total Taxes	$9.42	$9.94	$10.97	$11.99

Source: James A. Richardson and Author's Calculations

Thus, as a result of the increased deepening activities of the Corps of Engineers, the Louisiana economy will gain $43.96 million in direct spending, $34.60 million in secondary spending for a total spending impact of $78.56 million in just the first year. In addition, the Louisiana economy will gain $15.03 million of income for its residents and 272 jobs in the state. Local governments will gain $0.85 million annually in tax revenue, the state government $1.08 million in tax revenues, and the federal government $1.66 million annually in income tax revenues for just the first year. After the eight-year period of adjustment in the industry occurs, the impacts will be considerably larger. In 2024, the Louisiana economy will gain $146.83 million in direct spending, $115.57 million in secondary spending for a total spending impact of $262.40 million. In addition, the

Louisiana economy will gain $50.21 million of income annually for its residents and 908 new permanent jobs in the state. Local governments will gain $2.84 million annually in tax revenue, the state government $3.60 million in tax revenues, and the federal government $5.55 million annually in income tax revenues forever.

Table 12 presents the economic and state tax impact of the deepening project over the first 20 years, from 2017 to 2036. In the first 20 years, the total new spending in the State of Louisiana created by the deepening of the LMR and Tributaries will be $5.03 billion. The total new state tax revenue created by the deepening will be $69.00 million.

Table 12

Louisiana Economic Impact
(in Millions)

Year	Total Impact	State Taxes
2017	$78.56	$1.08
2018	$109.23	$1.50
2019	$142.98	$1.96
2020	$183.66	$2.52
2021	$206.16	$2.83
2022	$217.41	$2.98
2023	$239.90	$3.29
2024	$262.40	$3.60
2025	$267.65	$3.67
2026	$273.00	$3.75
2027	$278.46	$3.82
2028	$284.03	$3.90
2029	$289.71	$3.97
2030	$295.51	$4.05
2031	$301.42	$4.13
2032	$307.45	$4.22
2033	$313.59	$4.30
2034	$319.87	$4.39
2035	$326.26	$4.48
2036	$332.79	$4.57
Total	$5,030.03	$69.00

Source: Author's Calculations

THE ECONOMIC IMPACT ON THE UNITED STATES ECONOMY

In addition to the impact on the Louisiana economy in the handling and processing of the increased inbound and outbound cargo, the national economy will be impacted as well. In this section we look at the increased production that will result from the lower costs of transporting American made goods for export.

Goods exported from the United States compete in world markets. What this means is that the price of the goods is set by worldwide forces of supply and demand. According to economic theory, no individual seller can set the price but must take the price as given. What this means in this context is that the American producers of affected goods can sell additional quantities at the World price as a result of the lowered transportation cost.

Table 13 presents the total impact on the U. S. economy of the increases in production that will be created by the deepening changes over the eight-year period of the phase in. Although hundreds of commodities will be affected, this report only quantifies the gains resulting for the top affected commodities as identified in Table 6. The direct spending gain is the actual increase, in dollar values, that result from the increased production of the affected commodities. The secondary spending impact is the related gains in the U. S. economy that is caused by the increased output. In the example of agricultural production, the direct impact is the increased dollar value of crops produced. The secondary impact is the increase in demand for the seed producers, the warehouses that store the product, the transportation companies that ship the products, and so forth. The total impact is the sum of the direct and secondary impacts.

Secondary gains are estimated by using the Bureau of Economic Analysis (BEA) Input-Output Matrix for the United States economy (Source: United States Bureau of Economic Analysis, Input-Output Matrix, Industry-by-Commodity Total requirement, after Redefinitions, 2009. (http://www.bea.gov/industry/iotables/)).

Table 13

Economic Impact of Deepening the LMR to 50 Feet
(Dollar Figures in Millions)

2017	Spending					Taxes		
Commodity	Direct Spending	Indirect Spending	Total Spending	Earnings	Jobs	State and Local	Federal	Total Government
Imports:								
Petroleum	$783.4	$825.6	$1,609.0	$26.3	525	$17.5	$13.5	$31.0
Pig Iron	$-	$-	$-	$-	-	$-	$-	$-
Iron Ore	$-	$-	$-	$-	-	$-	$-	$-
Gasoline	$-	$-	$-	$-	-	$-	$-	$-
Sub-Total Imports	$783.4	$825.6	$1,609.0	$26.3	525	$17.5	$13.5	$31.0
Exports:								
Corn	$56.3	$75.0	$131.3	$17.1	343	$1.1	$1.9	$3.0
Soybeans	$117.9	$157.0	$274.9	$35.9	718	$2.3	$4.0	$6.3
Coal	$318.7	$209.2	$527.9	$97.6	1,952	$6.3	$10.8	$17.1
Crude Oil	$205.3	$134.8	$340.1	$62.9	1,258	$4.1	$7.0	$11.0
Pig Iron	$66.5	$68.8	$135.3	$17.7	353	$1.1	$2.0	$3.1
Iron Ore	$168.7	$174.6	$343.2	$44.8	896	$2.9	$5.0	$7.8
Sub-Total Exports	$933.3	$819.4	$1,752.7	$276.0	5,520	$17.8	$30.5	$48.3
Grand Total	$1,716.7	$1,645.0	$3,361.7	$302.3	6,045	$35.3	$44.0	$79.3

2018	Spending					Taxes		
Commodity	Direct Spending	Indirect Spending	Total Spending	Earnings	Jobs	State and Local	Federal	Total Government
Petroleum	$1,204.5	$1,269.4	$2,473.8	$40.4	808	$26.2	$20.3	$46.6
Pig Iron	$-	$-	$-	$-	-	$-	$-	$-
Iron Ore	$-	$-	$-	$-	-	$-	$-	$-
Gasoline	$-	$-	$-	$-	-	$-	$-	$-
Sub-Total Imports	$1,204.5	$1,269.4	$2,473.8	$40.4	808	$26.2	$20.3	$46.6

Table 13 (Continued)

Exports:								
Corn	$56.3	$75.0	$131.3	$17.1	343	$1.1	$1.9	$3.0
Soybeans	$93.6	$124.6	$218.2	$28.5	570	$1.8	$3.2	$5.0
Coal	$478.1	$313.8	$791.9	$146.4	2,928	$9.4	$16.2	$25.6
Crude Oil	$205.3	$134.8	$340.1	$62.9	1,258	$4.1	$7.0	$11.0
Pig Iron	$66.5	$68.8	$135.3	$17.7	353	$1.1	$2.0	$3.1
Iron Ore	$168.7	$174.6	$343.2	$44.8	896	$2.9	$5.0	$7.8
Sub-Total Exports	$1,068.4	$891.6	$1,960.0	$317.4	6,348	$20.5	$35.1	$55.6
Grand Total	$2,272.9	$2,161.0	$4,433.9	$357.8	7,156	$46.7	$55.5	$102.2

2019	Spending					Taxes		
Commodity	Direct Spending	Indirect Spending	Total Spending	Earnings	Jobs	State and Local	Federal	Total Government
Petroleum	$1,646.1	$1,734.8	$3,380.9	$55.2	1,104	$35.0	$27.3	$62.3
Pig Iron	$-	$-	$-	$-	-	$-	$-	$-
Iron Ore	$-	$-	$-	$-	-	$-	$-	$-
Gasoline	$-	$-	$-	$-	-	$-	$-	$-
Sub-Total Imports	$1,646.1	$1,734.8	$3,380.9	$55.2	1,104	$35.0	$27.3	$62.3
Exports:								
Corn	$56.3	$75.0	$131.3	$17.1	343	$1.1	$1.9	$3.0
Soybeans	$127.6	$169.9	$297.5	$38.8	777	$2.5	$4.3	$6.8
Coal	$637.4	$418.5	$1,055.9	$195.2	3,905	$12.6	$21.6	$34.2
Crude Oil	$273.7	$179.7	$453.4	$83.8	1,677	$5.4	$9.3	$14.7
Pig Iron	$66.5	$68.8	$135.3	$17.7	353	$1.1	$2.0	$3.1
Iron Ore	$168.7	$174.6	$343.2	$44.8	896	$2.9	$5.0	$7.8
Sub-Total Exports	$1,330.2	$1,086.5	$2,416.6	$397.5	7,950	$25.6	$44.0	$69.6
Grand Total	$2,976.3	$2,821.3	$5,797.6	$452.7	9,054	$60.6	$71.2	$131.9

Table 13 (Continued)

2020	Spending					Taxes		
Commodity	Direct Spending	Indirect Spending	Total Spending	Earnings	Jobs	State and Local	Federal	Total Government
Petroleum	$2,109.1	$2,222.7	$4,331.8	$70.7	1,415	$43.7	$34.3	$78.0
Pig Iron	$-	$-	$-	$-	-	$-	$-	$-
Iron Ore	$-	$-	$-	$-	-	$-	$-	$-
Gasoline	$-	$-	$-	$-	-	$-	$-	$-
Sub-Total Imports	$2,109.1	$2,222.7	$4,331.8	$70.7	1,415	$43.7	$34.3	$78.0
Exports:								
Corn	$97.7	$130.1	$227.8	$29.7	595	$1.9	$3.3	$5.2
Soybeans	$161.6	$215.2	$376.8	$49.2	984	$3.2	$5.4	$8.6
Coal	$796.8	$523.1	$1,319.8	$244.0	4,881	$15.7	$27.0	$42.7
Crude Oil	$342.2	$224.6	$566.8	$104.8	2,096	$6.8	$11.6	$18.3
Pig Iron	$128.1	$132.5	$260.6	$34.0	680	$2.2	$3.8	$6.0
Iron Ore	$324.9	$336.2	$661.1	$86.3	1,726	$5.6	$9.5	$15.1
Sub-Total Exports	$1,851.1	$1,561.8	$3,412.9	$548.1	10,962	$35.3	$60.6	$96.0
Grand Total	$3,960.2	$3,784.5	$7,744.7	$618.8	12,376	$79.1	$94.9	$174.0

2021	Spending					Taxes		
Commodity	Direct Spending	Indirect Spending	Total Spending	Earnings	Jobs	State and Local	Federal	Total Government
Petroleum	$2,450.0	$2,582.1	$5,032.1	$82.2	1,643	$49.6	$39.1	$88.6
Pig Iron	$-	$-	$-	$-	-	$-	$-	$-
Iron Ore	$-	$-	$-	$-	-	$-	$-	$-
Gasoline	$-	$-	$-	$-	-	$-	$-	$-
Sub-Total Imports	$2,450.0	$2,582.1	$5,032.1	$82.2	1,643	$49.6	$39.1	$88.6

Table 13 (Continued)

Exports:								
Corn	$97.7	$130.1	$227.8	$29.7	595	$1.9	$3.3	$5.2
Soybeans	$184.2	$245.4	$429.7	$56.1	1,122	$3.6	$6.2	$9.8
Coal	$903.0	$592.8	$1,495.8	$276.6	5,531	$17.8	$30.6	$48.4
Crude Oil	$387.8	$254.6	$642.4	$118.8	2,375	$7.7	$13.1	$20.8
Pig Iron	$128.1	$132.5	$260.6	$34.0	680	$2.2	$3.8	$6.0
Iron Ore	$324.9	$336.2	$661.1	$86.3	1,726	$5.6	$9.5	$15.1
Sub-Total Exports	$2,025.6	$1,691.7	$3,717.3	$601.5	12,030	$38.8	$66.5	$105.3
Grand Total	$4,475.7	$4,273.7	$8,749.4	$683.7	13,673	$88.3	$105.6	$193.9

2022	Spending					Taxes		
Commodity	Direct Spending	Indirect Spending	Total Spending	Earnings	Jobs	State and Local	Federal	Total Government
Petroleum	$2,659.0	$2,802.3	$5,461.3	$89.2	1,784	$52.5	$41.6	$94.1
Pig Iron	$-	$-	$-	$-	-	$-	$-	$-
Iron Ore	$-	$-	$-	$-	-	$-	$-	$-
Gasoline	$-	$-	$-	$-	-	$-	$-	$-
Sub-Total Imports	$2,659.0	$2,802.3	$5,461.3	$89.2	1,784	$52.5	$41.6	$94.1
Exports:								
Corn	$97.7	$130.1	$227.8	$29.7	595	$1.9	$3.3	$5.2
Soybeans	$195.6	$260.5	$456.1	$59.5	1,191	$3.8	$6.6	$10.4
Coal	$956.1	$627.7	$1,583.8	$292.8	5,857	$18.9	$32.4	$51.3
Crude Oil	$410.6	$269.6	$680.2	$125.8	2,515	$8.1	$13.9	$22.0
Pig Iron	$128.1	$132.5	$260.6	$34.0	680	$2.2	$3.8	$6.0
Iron Ore	$324.9	$336.2	$661.1	$86.3	1,726	$5.6	$9.5	$15.1
Sub-Total Exports	$2,112.9	$1,756.6	$3,869.5	$628.2	12,564	$40.5	$69.5	$110.0
Grand Total	$4,771.9	$4,558.9	$9,330.8	$717.4	14,348	$93.0	$111.1	$204.1

Table 13 (Continued)

2023	Spending					Taxes		
Commodity	Direct Spending	Indirect Spending	Total Spending	Earnings	Jobs	State and Local	Federal	Total Government
Petroleum	$3,028.3	$3,191.5	$6,219.8	$101.6	2,031	$58.3	$46.5	$104.8
Pig Iron	$-	$-	$-	$-	-	$-	$-	$-
Iron Ore	$-	$-	$-	$-	-	$-	$-	$-
Gasoline	$-	$-	$-	$-	-	$-	$-	$-
Sub-Total Imports	$3,028.3	$3,191.5	$6,219.8	$101.6	2,031	$58.3	$46.5	$104.8
Exports:								
Corn	$97.7	$130.1	$227.8	$29.7	595	$1.9	$3.3	$5.2
Soybeans	$218.3	$290.7	$509.0	$66.4	1,329	$4.3	$7.3	$11.6
Coal	$1,062.4	$697.4	$1,759.8	$325.4	6,508	$21.0	$36.0	$57.0
Crude Oil	$456.2	$299.5	$755.7	$139.7	2,795	$9.0	$15.5	$24.5
Pig Iron	$128.1	$132.5	$260.6	$34.0	680	$2.2	$3.8	$6.0
Iron Ore	$324.9	$336.2	$661.1	$86.3	1,726	$5.6	$9.5	$15.1
Sub-Total Exports	$2,287.4	$1,886.5	$4,173.9	$681.6	13,632	$43.9	$75.4	$119.3
Grand Total	$5,315.8	$5,078.0	$10,393.8	$783.2	15,663	$102.2	$121.9	$224.2

Table 13 (Continued)

2024	Spending					Taxes		
	Direct Spending	Indirect Spending	Total Spending	Earnings	Jobs	State and Local	Federal	Total Government
Petroleum	$3,414.4	$3,598.4	$7,012.9	$114.5	2,290	$64.1	$51.5	$115.6
Pig Iron	$-	$-	$-	$-	-	$-	$-	$-
Iron Ore	$-	$-	$-	$-	-	$-	$-	$-
Gasoline	$-	$-	$-	$-	-	$-	$-	$-
Sub-Total Imports	$3,414.4	$3,598.4	$7,012.9	$114.5	2,290	$64.1	$51.5	$115.6
Exports:								
Corn	$97.7	$130.1	$227.8	$29.7	595	$1.9	$3.3	$5.2
Soybeans	$240.9	$320.9	$561.9	$73.3	1,467	$4.7	$8.1	$12.8
Coal	$1,168.6	$767.2	$1,935.8	$357.9	7,158	$23.1	$39.6	$62.7
Crude Oil	$501.8	$329.5	$831.3	$153.7	3,074	$9.9	$17.0	$26.9
Pig Iron	$128.1	$132.5	$260.6	$34.0	680	$2.2	$3.8	$6.0
Iron Ore	$324.9	$336.2	$661.1	$86.3	1,726	$5.6	$9.5	$15.1
Sub-Total Exports	$2,462.0	$2,016.4	$4,478.4	$735.0	14,700	$47.4	$81.3	$128.7
Grand Total	$5,876.4	$5,614.8	$11,491.2	$849.5	16,991	$111.5	$132.8	$244.3

Source: Author's Calculations

The economic gains resulting from the enhanced deepening are significant for the country as a whole. Once all effects are phased in (in 2024), American producers, mostly farmers, could increase output by $2.46 billion. The ripple effect, or secondary spending effect, could add another $2.02 billion. The total potential gain to the U. S. economy of the enhanced deepening will be 4.48 billion in increased production once all affects are phased in.

In addition, the nation's economy will add 16,991 jobs as a result of the increases in production and $849.5 million in increased income for American workers. Finally, when the private sector increases production and jobs, state, local, and federal governments see increases in revenue. The economic impact resulting from the increased deepening will

create $111.5 million annually in increased revenues for state and local governments, and the federal government would gain $132.8 million in personal income tax revenues alone.

IMPACTS ASSOCIATED WITH REDUCED GASOLINE PRICES

The impact on the inbound, or import, side of the process is from lower retail prices of goods consumed in the United States. Although there are hundreds of goods affected, the largest impact by far is on the importation of crude oil. Thus, this section of the report will focus solely on the impact of the deepening on crude oil imports and the retail price of gasoline. The U. S. economy relies very heavily on imported crude and the refineries along the Mississippi River are critical in the production of gasoline for American consumers.

There has been a great deal of discussion in recent years about the impact of fracking and other techniques that will increase domestic crude oil and natural gas production and make the United States energy efficient. Although that is a possibility, it is unlikely to have a major impact on the importation of crude oil in the next decade. The environmental costs of fracking, the costs and lengthy time period for conversion of a large portion of the domestic auto and truck market to natural gas, the lack of a natural gas delivery infrastructure, and the relative low prices of foreign oil should continue to produce large imports of crude oil into the United States. The impacts of a somewhat reduced demand for crude oil has been accounted for in this study by assuming a small (one-half of one percent) increase in oil imports as a result of the lowered costs of moving oil in larger vessels.

The enhanced deepening could cause an increase of 4.79 million short tons of crude oil in just one year (See Table 7). There are 7.33 barrels of crude oil in one short ton. Thus, the deeper channels could cause the increase of 35.08 million barrels of oil imported into the United States. In 2011, U. S. oil refineries used 6.61 billion barrels of crude oil in producing gasoline for American consumers (Source: U. S. Energy Information Administration). Thus, the deepening enhancements could cause an increase of 0.5% of all crude oil and a corresponding increase in the amount of gasoline refined from that crude.

In order to estimate the impact of the 0.5% increase in gasoline production to consumers on the price of gasoline, it is necessary to know the relationship between price and quantity consumed. That relationship is described by the elasticity of demand. The elasticity of demand is defined as the percentage change in quantity that results from a one percent change in price. That relationship is always negative, meaning that an increase in price will cause a reduction in quantity demanded and a decrease in price will result in an increase in quantity demanded.

There are many empirical studies of the short-run elasticity of demand for gasoline. According to a recent study, the average price elasticity of demand for gasoline in the United States is -0.26 (Source: Molly Espey, "Explaining the Variation in Elasticity Estimates of Gasoline Demand in the United States; a Meta-Analysis," in Energy Journal, Vol. 17, # 3, PP. 49-60, 1996). That means that a 0.53% increase in the quantity supplied of gasoline will cause a 2.04% decrease in price (0.0053/0.26).

Thus, it can be anticipated that the deeper channels on the LMR and the resulting 0.53% increase in gasoline supply could result in a 2.04% decrease in price. The current average retail price of gasoline is $3.54 (Source: U. S. Energy Information Administration). Thus, the draft enhancements would cause a $0.072 decrease in retail gasoline prices. In 2011, consumers in the United States consumed 10.85 billion gallons of gasoline. The deeper channel will cause a gain to consumers of $0.072 for every gallon consumed or a total impact of $783.40 million annually in lower gasoline expenditures. The increase in quantity demanded could be 57.54 million gallons in just the first year.

In addition to the impact on the consumers, federal and state and local government will gain also. Gasoline is heavily taxed in the United States. At the federal level, the gasoline tax is $0.184 per gallon consumed. At the state level, the average tax is $0.344 per gallon (Source: American Petroleum Institute, http://www.api.org/statistics/fueltaxes/). In total, every extra gallon of gasoline consumed in the United States produces $0.488 in tax revenue for state and federal governments. Thus, the deeper draft would enhance state government gasoline tax revenue by $17.5 million and federal government gasoline tax revenue by $13.5 million in just the first year of deeper drafts along the LMR. The total gain to governments would be $31.0 million in year 1. Table 14 summarizes the impacts on lower gasoline prices and related activities. After the effects are fully phased in, in 2024, the deeper drafts and larger loads accommodated by the deeper drafts would free up $3.41 billion annually for increased spending in other areas of the economy. In addition, the deeper drafts would create $51.5 million annually in new tax revenues for the federal government and $64.1 million annually for state governments in the United States just related to lower gasoline prices.

Table 14

Impact of Deepening the LMR to 50 Feet on Gasoline Prices and Quantities

Category	2017	2018	2019	2020	2021	2022	2023	2024
Barrels of crude oil gained	35.1	52.6	70.2	87.7	99.4	105.2	116.9	128.6
Bbls of crude oil used in US	6,614.2	6,614.2	6,614.2	6,614.2	6,614.2	6,614.2	6,614.2	6,614.2
Percent Gained	0.5%	0.8%	1.1%	1.3%	1.5%	1.6%	1.8%	1.9%
Change in Price	2.0%	3.1%	4.1%	5.1%	5.8%	6.1%	6.8%	7.5%
Current Gasoline Price	$3.54	$3.63	$3.72	$3.81	$3.91	$4.01	$4.11	$4.21
Price Decrease	$0.07	$0.11	$0.15	$0.19	$0.23	$0.25	$0.28	$0.31
Gas Used in 2011 (in gall)*	10,849.9	10,849.9	10,849.9	10,849.9	10,849.9	10,849.9	10,849.9	10,849.9
Increased Usage (in gall)*	57.5	86.3	115.1	143.8	163.0	172.6	191.8	211.0
Direct Impact**	$783.4	$1,204.5	$1,646.1	$2,109.1	$2,450.0	$2,659.0	$3,028.3	$3,414.4
Secondary Impact**	$825.6	$1,269.4	$1,734.8	$2,222.7	$2,582.1	$2,802.3	$3,191.5	$3,598.4
Total Impact**	$1,609.0	$2,473.8	$3,380.9	$4,331.8	$5,032.1	$5,461.3	$6,219.8	$7,012.9
Earnings Gain**	$26.3	$40.4	$55.2	$70.7	$82.2	$89.2	$101.6	$114.5
Employment Gain	525	808	1,104	1,415	1,643	1,784	2,031	2,290
Federal Gas Tax Gain**	$13.5	$20.3	$27.3	$34.3	$39.1	$41.6	$46.5	$51.5
State Gas Tax Gain**	$17.5	$26.2	$35.0	$43.7	$49.6	$52.5	$58.3	$64.1
Total Gas Tax Gain**	$31.0	$46.6	$62.3	$78.0	$88.6	$94.1	$104.8	$115.6

* In millions of gallons
** In millions of dollars

Source: Author's Calculations

TOTAL IMPACT INCLUDING ALL EXPORT AND IMPORT IMPACTS

The total economic impact of deepening the LMR consists of two separate components: 1) Increased production in the United States caused by the lower costs of exporting goods to other countries; and 2) The impact of lower gasoline prices due to the reduced costs of importing crude oil into the United States. Adding these two components together produces the total impact of deepening the Lower Mississippi River and tributaries to allow for 50-foot depths.

Once all effects are phased in (in 2024), American producers, mostly farmers, and consumers will see a direct positive impact of $5.876 billion. The ripple effect, or secondary spending effect, could add another $5.615 billion. The total potential gain to the U. S. economy of the enhanced deepening will be $11.491 billion in increased production and lower gasoline prices once all effects are phased in.

In addition, the U.S. economy will add 16,991 jobs as a result of the increases in production and $849.5 million in increased income for American workers. Finally, when the private sector increases production and jobs, state, local, and federal governments see increases in revenue. The economic impact resulting from the increased deepening will create $111.5 million annually in increased revenues for state and local governments and the federal government would gain $132.8 million annually in tax revenues. See Table 12 for a recap of these figures.

CONCLUSION: A BENEFIT/COST ANALYSIS OVER A MULTI-YEAR PERIOD

It has been estimated that the costs of deepening the Lower Mississippi River to 50 feet will cost up to $300 million initially and as much as $90 million per year in additional (incremental) expenditures to maintain the River at 50 feet. This section of the report presents the benefit/cost analysis of the decision to spend the additional funds. The benefits of this action are the economic impacts documented in this report and the costs are the increased spending on the part of the U. S. Army Corps of Engineers. For the sake of simplicity, this section will focus on the following categories of the economic impacts associated with the deepening:

1. Direct spending
2. Total spending
3. Federal taxes
4. Total taxes
5. Earnings for citizens
6. Employment.

To simplify the benefit/cost ratio will compare costs to only three benefit categories: new direct spending, new total spending, and new Federal government revenues created.

Table 15 presents the expected costs (federal government costs from increased deepening activities) and the expected benefits (economic gains due to the increased cargo movements) from 2017 to 2036 or a period of 20 years. Clearly, the benefits will persist well beyond 2036 but that date should be sufficient to make the comparison. The major assumption in Table 14 is that the initial deepening will be done in 2016 as the new Panama Canal opens. To allow for possible delays in the completion date of the scheduled opening of the new Panama Canal, allowing for adequate time for initial deepening activities, and giving the maritime industry time to adjust, this study assumes that larger ships will not be able to take advantage of the deeper drafts until 2017. Table 16 presents the same data but uses the present value of all future values to accurately compare benefits and costs over time.

Table 15

Benefits and Costs Associated
with Deepening the LMR to 50 Feet
(in Millions of $s)

Year	Dredging Costs	Direct Spending	Total Spending	Federal Tax Revenue
2016	$300.00	$-	$-	$-
2017	$90.00	$1,716.72	$3,361.69	$44.02
2018	$91.80	$2,318.32	$4,522.53	$56.56
2019	$93.64	$3,096.54	$6,031.78	$74.12
2020	$95.51	$4,202.60	$8,218.74	$100.72
2021	$97.42	$4,844.64	$9,470.66	$114.31
2022	$99.37	$5,268.60	$10,302.01	$122.67
2023	$101.35	$5,986.42	$11,705.09	$137.29
2024	$103.38	$6,750.15	$13,199.81	$152.52
2025	$105.45	$6,885.15	$13,463.81	$155.57
2026	$107.56	$7,022.85	$13,733.08	$158.68
2027	$109.71	$7,163.31	$14,007.74	$161.86
2028	$111.90	$7,306.58	$14,287.90	$165.09
2029	$114.14	$7,452.71	$14,573.66	$168.39
2030	$116.42	$7,601.76	$14,865.13	$171.76
2031	$118.75	$7,753.80	$15,162.43	$175.20
2032	$121.13	$7,908.88	$15,465.68	$178.70
2033	$123.55	$8,067.05	$15,774.99	$182.28
2034	$126.02	$8,228.39	$16,090.49	$185.92
2035	$128.54	$8,392.96	$16,412.30	$189.64
Total	$2,355.65	$117,967.44	$230,649.53	$2,695.29
B/C Ratio	NA	50.1	97.9	NA

Source: Author's Calculations

Table 16

Present Value of Benefits and Costs Associated
with Deepening the LMR to 50 Feet
(in Millions of $s)

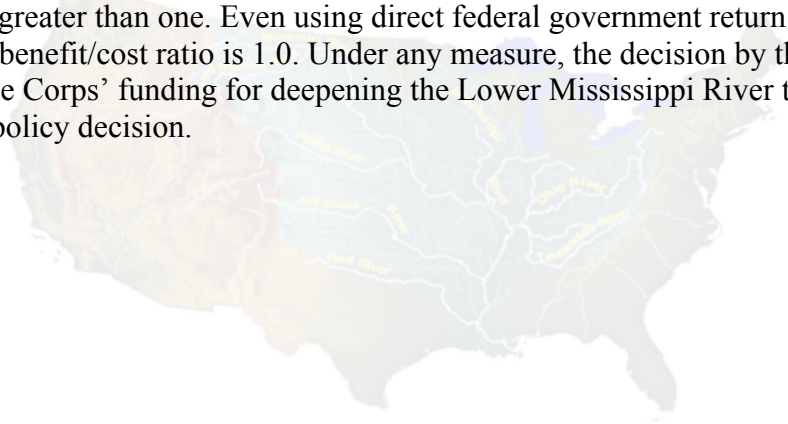
Year	Dredging Costs	Direct Spending	Total Spending	Federal Tax Revenue
2016	$300.00	$-	$-	$-
2017	$86.96	$1,658.67	$3,248.01	$42.53
2018	$85.70	$2,164.18	$4,221.83	$52.80
2019	$84.45	$2,792.90	$5,440.32	$66.85
2020	$83.23	$3,662.32	$7,162.16	$87.77
2021	$82.02	$4,079.05	$7,974.04	$96.25
2022	$80.84	$4,286.01	$8,380.69	$99.79
2023	$79.66	$4,705.27	$9,200.09	$107.91
2024	$78.51	$5,126.14	$10,024.09	$115.83
2025	$77.37	$5,051.85	$9,878.81	$114.15
2026	$76.25	$4,978.63	$9,735.64	$112.49
2027	$75.15	$4,906.48	$9,594.54	$110.86
2028	$74.06	$4,835.37	$9,455.49	$109.26
2029	$72.98	$4,765.29	$9,318.46	$107.67
2030	$71.92	$4,696.23	$9,183.41	$106.11
2031	$70.88	$4,628.17	$9,050.31	$104.57
2032	$69.86	$4,561.10	$8,919.15	$103.06
2033	$68.84	$4,494.99	$8,789.89	$101.56
2034	$67.85	$4,429.85	$8,662.50	$100.09
2035	$66.86	$4,365.65	$8,536.95	$98.64
Total	$1,753.39	$80,188.16	$156,776.38	$1,838.19
B/C Ratio	NA	45.7	89.4	NA

Source: Author's Calculations

The case for increased spending on deepening could not be clearer. Table 15 presents the expected annual benefits and costs of increased deepening to 50 feet. The present value of the stream is also presented. The future benefits and costs are discounted to the present using the current long-term (20 Year Constant Maturity) U. S. Treasury bond rate of 3.50%. The present value of the ten-year projections of the benefits and costs from reduced deepening presents a startling comparison. The benefits of the activity outweigh the costs no matter what measure of benefits are used.

If direct impacts are used as the benefit measure, the B/C ratio is 45.7. In cost benefit analysis, a B/C ratio of one implies that the benefits and costs are equal. A B/C ratio of more than one implies the benefits outweigh the costs and a B/C ratio of less than one implies the costs outweigh the benefits. If total impacts are used, the B/C ratio is 89.4. Finally, the new tax revenues created by the deepening will offset the costs of the dredging project. The project pays for itself and creates billions of dollars of new spending in the United States economy and almost 17,000 new permanent jobs in the country.

Clearly, no matter what measure of benefits is employed, the result is a B/C ratio of significantly greater than one. Even using direct federal government return in tax revenues the benefit/cost ratio is 1.0. Under any measure, the decision by the government to increase the Corps' funding for deepening the Lower Mississippi River to 50 feet is a good public policy decision.



USACE Institute of Water Resources
7701 Telegraph Road
ALEXANDRIA, VIRGINIA 22315

MEMORANDUM FOR THE RECORD:

DATE: 24 August 2012

SUBJECT: Response to Comments from Big River Coalition

BACKGROUND: The June 20, 2012 Institute for Water Resources (IWR) report *U.S. Port and Inland Waterways Modernization: Preparing for Post-Panamax Vessels* broadly examines the need for U.S. port and inland waterways modernization to accommodate the future use of post-Panamax size vessels serving U.S. markets. The report primarily considers the ability of U.S. ports to accommodate the larger container vessels expected to call in the future. The report looks at the impacts of larger bulk vessels serving the agricultural export market from the Gulf coast to Asia, but only in relation to impacts on the inland waterways.

ISSUE: In written comments (attached) and in a meeting with IWR, the Big River Coalition (BRC) expressed concern that the Port & Inland Waterways Modernization report failed to highlight deepening opportunities for bulk commodity trade. As a representative of navigation interests on the Lower Mississippi River (LMR), the BRC fears that this omission will prejudice the selection process for the Administration's "We Can't Wait" initiative, which, in its first announcement, selected five container ports to be expedited.

ANALYSIS: The Federal channel on the LMR has an authorized depth of 55 feet. However, the channel was constructed and is maintained to 45 feet of depth. Maintenance costs for channels up to 45 feet, including the LMR, are paid entirely by the Federal government. However, the increase in maintenance costs incurred for channels depths greater than 45 feet must be shared with a local sponsor. Such a cost-share requirement means that deepening the LMR beyond the current constructed depth would require a willing sponsor to agree to share in any increased maintenance costs. In addition, USACE maintenance operations typically over-dredge a channel and then allow the channel to silt in back to the constructed depth. Hence, the available depth of the LMR channel is often greater than 45 feet.

The Port & Inland Waterways Modernization report highlighted ongoing studies at several container ports but did not identify deepening opportunities to accommodate post-Panamax bulk vessels. While there is no active Corps effort to deepen the LMR channel to its authorized depth of 55 feet, the BRC is actively working with the Corps to initiate a deepening effort. The BRC asserts that if the Federal channel were deepened to 50 feet from Venice, LA to the Sea Bouy (about 30 miles) it would allow access to 175 miles of river from the Gulf of Mexico (beyond Head of Passes) without any additional dredging.

CONCLUSION: IWR agrees that Port & Inland Waterways Modernization report could have considered deepening Federal channels on the Gulf coast to primarily serve post-Panamax bulk

vessels. Such waterway modernization efforts are well within the range of opportunities presented by the increasing deployment of post-Panamax sized vessels of all types.
While IWR makes no judgment as to the economic and environmental merits of deepening the LMR to 50 feet, the Port of South Louisiana's classification as a "national" bulk port using the study's "Index of Regional Trade," coupled with the expected deployment of larger bulk vessels in the world fleet suggest it is reasonable to consider the merits of such action in more detail.

POINTS OF CONTACT. Hal Cardwell, Director USACE Conflict Resolution and Public Participation Center of Expertise, 703-428-9071; Hal.E.Cardwell@usace.army.mil; Keith Hofseth, Technical Director, Port & Waterways Modernization Report, 703-428-6468, Keith.D.Hofseth@usace.army.mil.